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(54) Call routing

(57) A method of routing calls, messages or information (call routing) comprising storing in a memory a database 19 representing a relationship or organization roles, including names of persons filling the roles and call directory numbers associated with the roles, in response to a request to complete a call to a particular directory number associated with one of the roles, looking up in the database a directory number associated with one of the roles, and processing the call as if the call were directed to the further directory number.

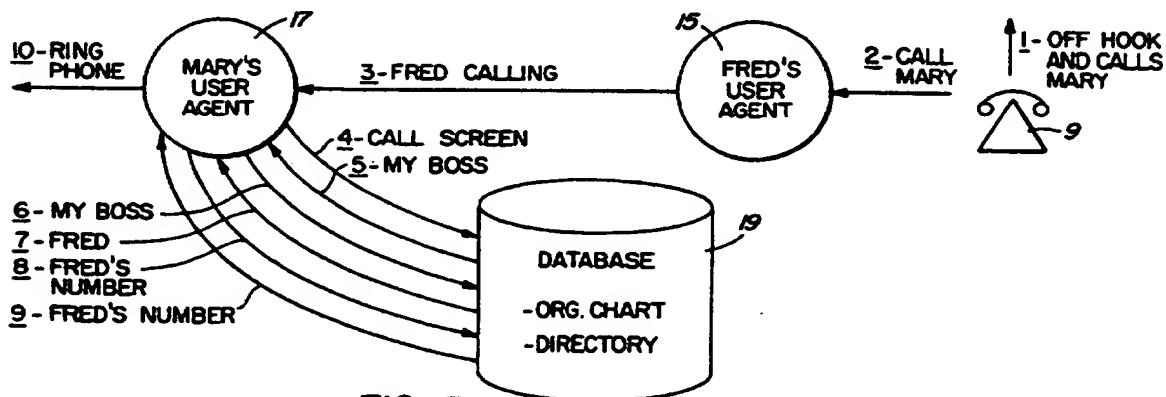


FIG. 5

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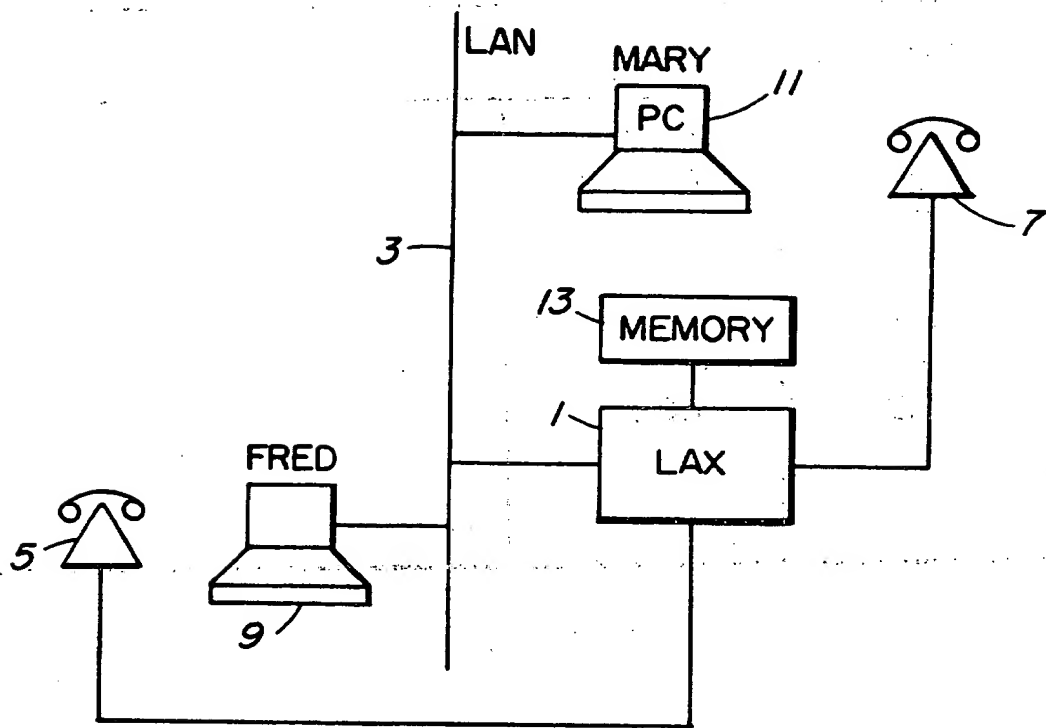


FIG. 1

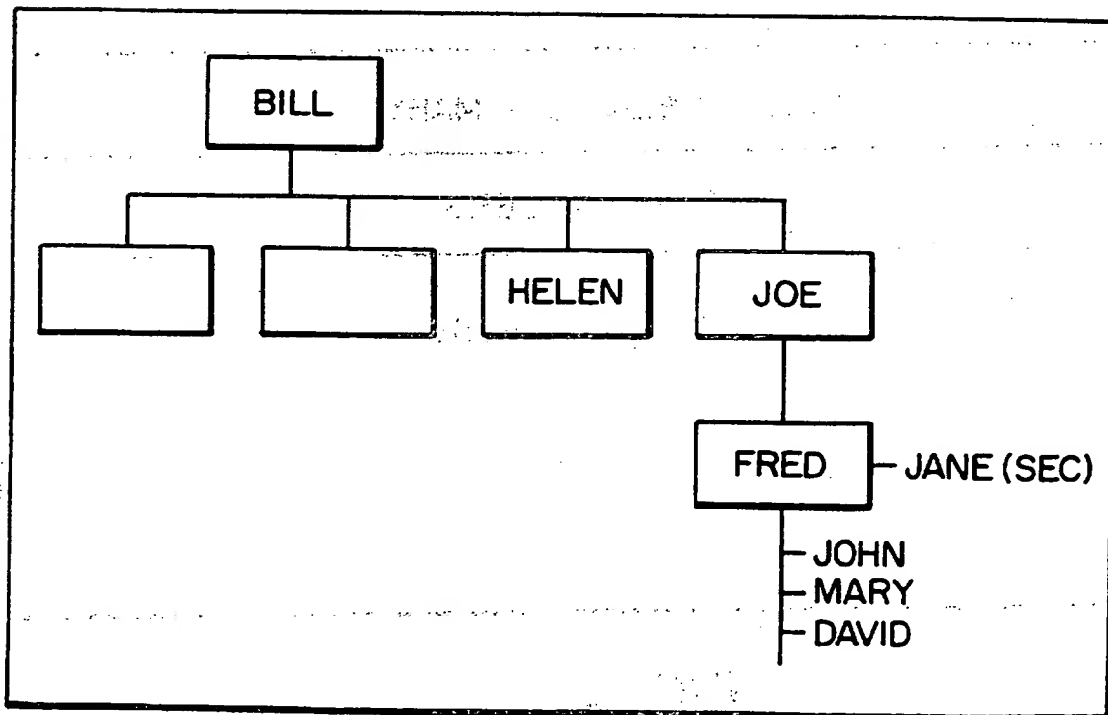


FIG. 2

NAME	EXT #	
BILL	1600	
HELEN	1601	
JOE	1602	
FRED	1603	
JOHN	1604	
MARY	1605	
DAVID	1606	
.		
.		

FIG. 3

CALL SCREENING - MARY
ALLOWED CALLERS
1603 <u>OR</u> MY BOSS

FIG. 4

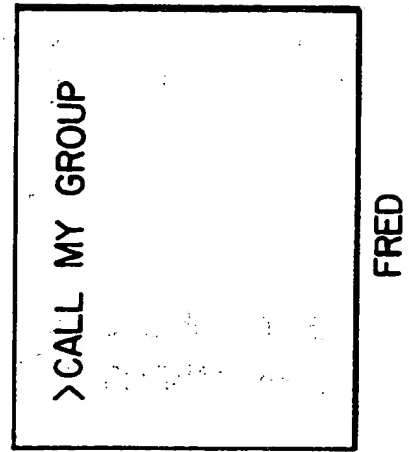
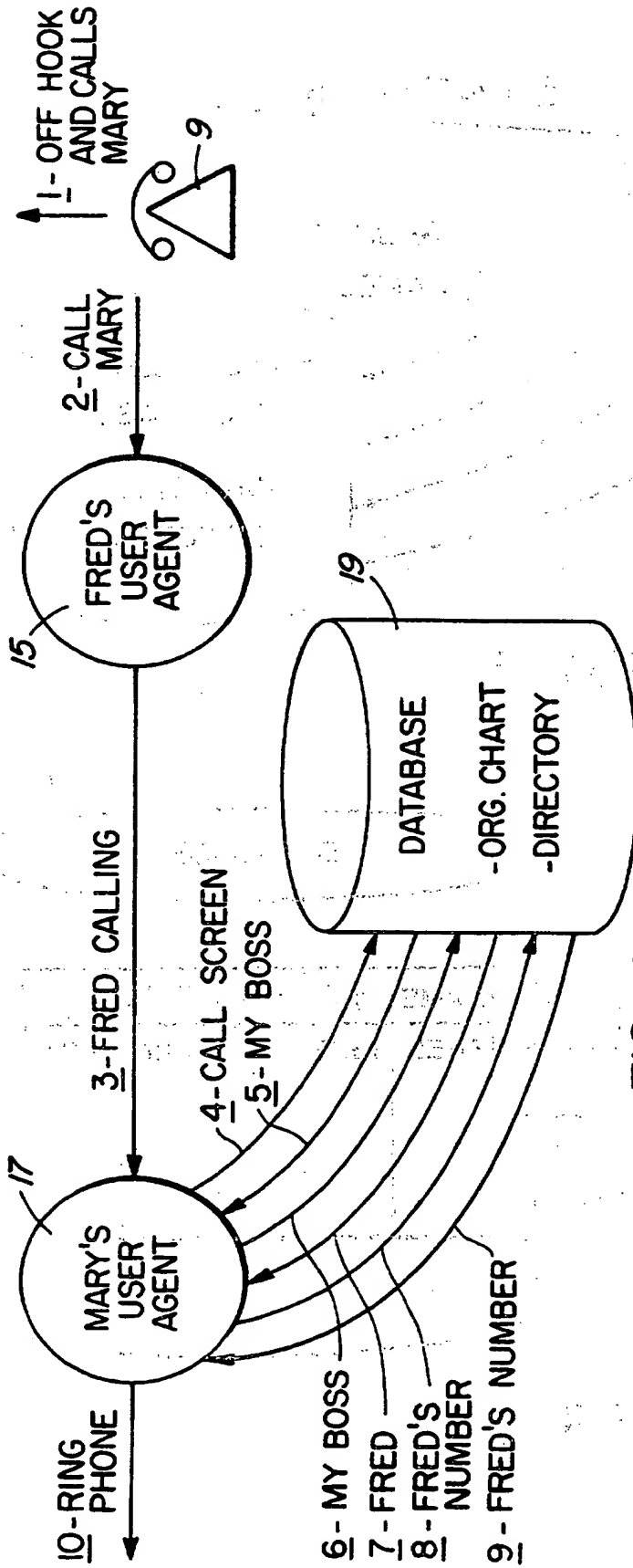


FIG. 6

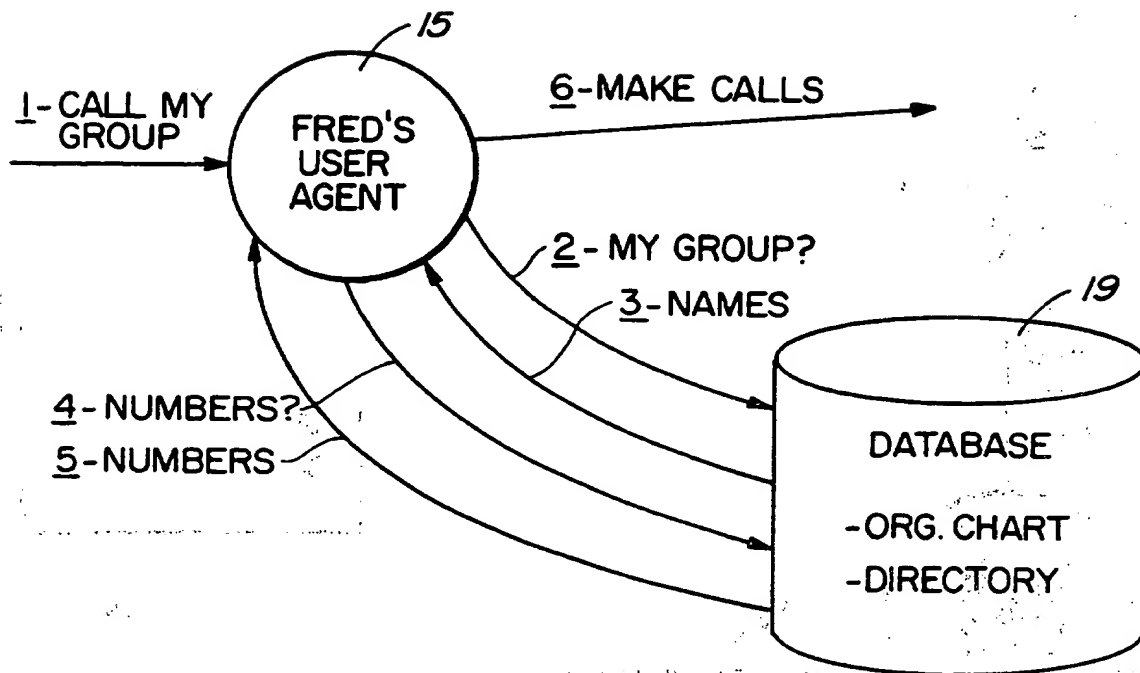


FIG. 7

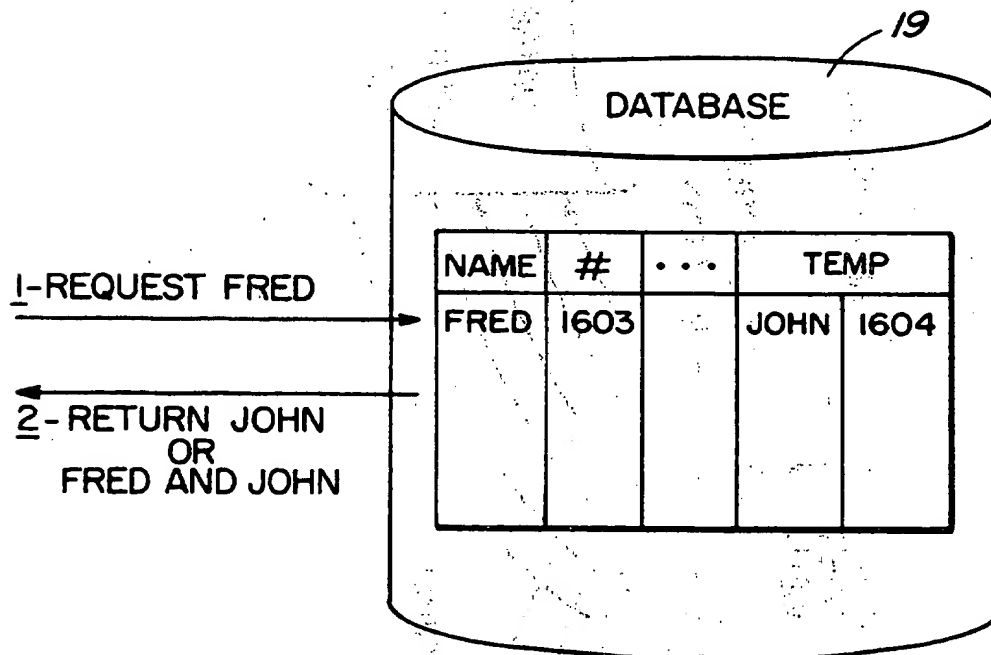


FIG. 8

CALL ROUTING IN A COMMUNICATION SYSTEM

This invention relates to the communication field. A particular method of call routing in a communication system, such as a telephone switching system, will be described below, by way of example, in
5 illustration of the invention.

Users of telephone switching systems in organizations typically have features which are provided by the switching systems, and as one of the features retain a directory of speed call numbers. When the
10 persons who are in certain roles in the organization change, each member of the organization which retains the persons who have changed roles in a directory must update the directory. In addition, as a member of the organization changes, the special features can change.

For example, assume that a member of the organization has call screening as a feature. That member has set up the call screening feature to only allow calls to be completed to the member's telephone if the call is from that person's boss. The member would
20 enter the boss' telephone number (e.g. extension number) into a call screening list associated with that member. Now if the boss is moved to a new roll, and retains the same telephone number, the call screening feature number of the member's new boss would have to be entered.

Similarly, in the event that the member wants to send an electronic mail message to each member of a group, the name and associated number of each member would have to be looked up in a directory, and the message sent to each of the identified numbers. In the
30 event the members of the group change, the member would have to modify the directory for each changed, added or deleted member.

Entering of the change data by each member of the organization is prone to error, and takes significant unproductive time.

5 A feature of a method of call routing to be
described below, by way of example, in illustration of
the invention is that it uses a data base which
identifies members of the organization by roles, rather
than merely names and numbers. Preferably the
identification is based on an organization chart. The
10 organization chart contains or uses the data from a
directory, and a correlation is made between roles in an
organization and features such as the routing of calls,
electronic mail, etc. Features such as call screening,
electronic mail mailing lists, etc. are set up based on
15 roles, rather than directory numbers, so that when the
organization chart is changed, the identities of persons
dealt with by the features are automatically updated.

In a particular method of routing calls, messages
or information (call routing) to be described below, by
20 way of example, in illustration of the invention includes
the steps of storing in a memory a database representing
a relationship of organization roles, including names of
persons filling said roles and call directory numbers
associated with the roles, looking up in the database a
25 directory number associated with the one of the roles, in
response to a request to complete a call to a particular
directory number associated with one of the roles, and
processing the call as if the call were directed to the
further directory number.

30 The term "call routing" is intended to be
construed to include routing of calls, or messages, or
other information.

Arrangements illustrative of the invention will
now be described, by way of example, with reference to

the accompanying drawings, in which:-

Figure 1 is a block diagram illustrating a hardware architecture system for implementing the present invention,

5 Figure 2 is a representation of data stored in a database in accordance with an embodiment of the invention,

10 Figure 3 is a representation of other data stored in a database in accordance with an embodiment of the invention,

 Figure 4 is a representation of still other data stored in a database in accordance with an embodiment of the invention

15 Figure 5 is a representation of a process in accordance with an embodiment of the invention,

 Figure 6 is an illustration of a computer screen displaying a command used in another embodiment of the invention,

20 Figure 7 is a representation of a process in accordance with another embodiment of the invention, and

 Figure 8 is a representation of other data stored in a database in accordance with another embodiment of the invention.

25 Figure 1 illustrates basic elements of a hardware system architecture on which the present invention may be implemented. The system is described in U.S. patent application serial number 339,463 filed November 14, 1994 and entitled LOCAL AREA COMMUNICATIONS SERVER, and preferably operates using software agents in a manner as
30 described in U.S. patent application 257,917 filed June 10, 1994 and entitled ADAPTIVE COMMUNICATION SYSTEM and U.S. patent application 367,821 filed January 3, 1995 and entitled ADAPTIVE COMMUNICATION SYSTEM, all of which are incorporated herein by reference. The

present invention however is not limited to the structures and methods of operation described in these patent applications.

5 Figure 1 reproduces pertinent parts of Figure 1 of the aforementioned patent application serial number 339,463, and shows a local area communication system (LAX) 1 connected to a local area network (LAN) 3. Various telephones 5 and 7 correspond to telephones 5 and 10 13 respectively of U.S. application 339,463. Personal computers 9 and 11 associated with telephone users correspond to computers 1A and 1B of the latter patent application. Each of the telephone-personal computer combinations is labelled with the name of a user, e.g. 15 Fred and Mary, for better understanding of the description of the invention which follows.

 A memory 13 associated with the LAX stores a relational database of the following kind. The database contains an organizational chart 15 as shown in Figure 2, 20 which contains definitions of roles and associates them with names of individuals. What is meant by definitions of roles is relationships of reporting structures, identification of groups, etc. For example, in Figure 2, both Helen and Joe are shown reporting to Bill, Fred 25 reports to Joe, Jane is Fred's secretary, and the group comprising John, Mary and David report to Fred.

 The database shown in Figure 2 need not be in graphical form as shown, but can be in any database form that can store the relationships of the organization, 30 such as the one shown. The database can store the title or identity of the role, in addition to the name of the incumbent.

 The database should also store the telephone directory number of each of the persons in the

organization chart, as shown in Figure 3. Records are shown in the directory which correlates names in a first column and extension (directory) numbers in a second.

5 The database should also store feature data, as shown in Figure 4. For example, Mary has a call screening feature, in which allowed callers (callers whose incoming calls are allowed to complete calls to Mary's telephone or computer) are identified. Mary has entered the extension number 1603 (which identifies Fred,
10 and may be seen in the directory of Figure 3), which is a specific line.

In accordance with an embodiment of the present invention, the callers can be identified by role, rather than by number. Thus when the organization changes, the
15 database and in particular the organization chart in the database is updated, and as a result the features that identify a role rather than a person automatically cause the system to process an incoming call from, or an outgoing call to, a line to operate correctly with
20 respect to the real intention of the user, without the user having to learn of the change, the details of the change and update each feature manually.

Mary has therefore also entered MY BOSS in the Allowed Callers list in the call screening feature stored
25 in the database, which may be seen from the organization chart of Figure 2 as identifying Fred. This means that whoever fills the role of Mary's boss (e.g. permanently or for the day) will have calls allowed through to Mary.

30 The above will become clearer from an understanding of some examples which follow.

Turning to Figure 5, which shows the flow of the process in accordance with an embodiment of the invention, assume that Fred goes off hook (step 1) and dials Mary. Fred's user agent 15 is informed (step 2).

Fred's user agent 15 informs Mary's user agent 17 of the attempt to call Mary (step 3), including the identity number (e.g. extension number) of Fred.

5 Mary's user agent 17 checks call screening in the database 19 stored in memory 13 (step 4), which responds with the identities of all incoming calls which are allowed to complete calls to Mary's line. This list includes MY BOSS (step 5).

10 Mary's agent then looks up the identity of Mary's boss in the database (Figure 2) (step 6), which returns the name "Fred" (step 7). Mary's agent then looks up the directory number of the identified Fred in the directory stored in the database (Figure 3) (step 8), and receives it from the database (step 9), and matches it with the
15 identity number of the calling party.

Upon finding a match between the identity number of the calling party and the identity number of Fred retrieved from the directory, Mary's agent passes the information to other agents of the switching system to
20 allow the call to be completed to Mary.

If the identity number of the calling party does not match the retrieved number of Fred, Mary's user agent can instruct other agents of the switching system to complete the call to Mary's secretary, to a voicemail
25 system, etc.

Thus for this example, entry of the number 1603 in the feature allowed caller list was redundant, and need not have been entered. It may be seen that should
30 Mary's boss have been changed, with or without a new directory number, there is no need for Mary to check and possibly update her feature data, since the system would automatically route calls from her boss to her.

Assuming for example that Mary's boss is being changed for a week, due to Mary joining another group

for a week, the database data shown in Figure 2 would be changed to place Mary in a different line, for example reporting to Helen. The central database data shown in Figure 3 would be changed, if necessary, to list Mary's new directory extension number. However Mary does not have to pay attention to her personal feature list data, since the system operates as described above to route calls from her new boss Helen to her new telephone line, and to block completion of other calls to her (other than calls from extension 1603 if that number is still in her personal feature database.

As another example, Fred may want to make telephone calls to each member of his group. Rather than having a list of the names of each member of his group and individually looking up the corresponding numbers, Fred can type a command into a computer-telephone interface (CTI) application program running on the LAX or in his personal computer, which for example is shown in Figure 6 as ">Call My Group".

As shown in the process chart of Figure 7, the command is received by Fred's user agent 15 (step 1). The user agent as a result looks up the names of all members of Fred's group in the database 19 (step 2), by consulting the organization chart (Figure 2) stored in the database. The names of the members of Fred's group are then returned to Fred's agent 15 (step 3). Fred's agent then consults the database (Figure 3) to obtain the directory numbers of each member of Fred's group, by looking up their names (step 4). The corresponding directory numbers are returned to the agent from the database (step 5). The names correlated to the directory numbers of all of the members of Fred's group can then be displayed on the screen of Fred's personal computer. Fred then can make calls to each or any of the members of

his group (step 6).

It may be seen that by storage of the organization chart in the database, a user can automatically obtain the directory listings of everyone in the group, without having to remember the name of everyone in the group. For example, without the use of the present invention, a boss could accidentally forget the name of a new member of the group, or the existence or name of a temporary member, and the result could be a missed instruction, a missed meeting, information not being passed, etc.

In a similar manner, the list of members and their directory numbers returned as a result of Fred's request can be used to route electronic mail. Once the list is available to Fred, he can use his CTI application to send a mail message to all members of his group listed (or to particular single or plural members which he can indicate by selection from the display) at the same time.

Figure 8 illustrates another embodiment of the invention, in which the directory stored in the database is modified by the addition of fields identifying temporary replacements for various persons. In the example shown, "John" at extension 1604 is listed as temporarily replacing Fred. Thus when the directory in the database is being looked up for Fred's role directory number (or for Fred's directory number) (step 1), in the event the "temporary" field in Fred's directory record is filled in, either John's directory number is returned, or both Fred's and John's directory number.

This embodiment of returning Fred's substitute directory number can function when directory numbers are being looked up for information purposes, or during the processing of a call. For example, for an incoming call to Fred's role, the system agent can look up the

database to determine Fred's directory number and receive John's temporary replacement directory number, and use that number, i.e. send that number to John's agent to complete the call intended for Fred, to John.

5 The role identities are thus used both in the centralized database usable by all subscribers (e.g. Figures 2 and 3) as well as in individual database sections associated with particular subscribers (Figure 4), for example as data relating to particular features
10 usable by particular subscribers.

 The present invention is not limited to the particular features described, but can be used for any feature in which subscribers are to be identified as called or calling parties, or potential called or calling
15 parties, or in which information related to parties which fulfill roles is to be retrieved.

 As an example, the term "role" can be construed as "expert". This can be used in a help desk like environment where the role of expert in a particular area
20 can change. This function can be used instead of traditional hunt groups.

 A person understanding this invention may now conceive of alternative structures and embodiments or variations of the above. All of those which fall within
25 the scope of the claims appended hereto are considered to be part of the present invention.

CLAIMS

1. A method of routing calls, messages or other
5 information (call routing) including the steps of:

(a) storing in a memory a database representing
a relationship or organization roles, including names of
persons filling said roles and call directory numbers
associated with said roles,

10 (b) in response to a request to complete a call
to a particular directory number associated with one of
said roles, looking up in said database a directory
number associated with said one of said roles, and

15 (c) processing said call as if the call were
directed to said further directory number.

2. A method as defined in claim 1 further
including said database containing a feature stored in
association with said one of said roles, and processing
20 said call in a manner modified by the feature.

3. A method as defined in claim 1 including
storing the database in association with a particular
line, said database containing a feature stored in
25 association with said with said particular line, and
processing said call in a manner modified by the feature.

4. A method as defined in claim 3 wherein said
feature defines process attributes relating to various
30 ones of said roles, and processing said call based on
attributes related to a call from or to a line associated
with said one of said roles.

5. A method as defined in claim 4 in which said
35 feature is call screening including a list of calling

roles for which incoming calls are allowed to be completed to a particular line, and processing an incoming call by receiving a signal identifying a calling line, looking up a role associated with the calling line in the database, retrieving said feature including said list of lines associated with roles for which incoming calls are allowed to ring said particular line, and completing the call in the event that the role associated with the calling line is on said list.

6. A method as defined in claim 5 including completing the call to another line in the event the calling line is not on the list.

7. A method as defined in claim 4 in which the step of completing the call includes ringing a line associated with said particular directory number.

8. A method as defined in claim 4 in which said feature is directory retrieval, including a list of directory members of a group filling a particular role, and processing an outgoing call by looking up said role in the database, and retrieving each of the directory numbers in said list, and dialing at least one of the retrieved directory numbers.

9. A method as defined in claim 2 in which the feature is special access, storing an alternate special access directory number in association with a particular role, and processing an outgoing call by looking up the role associated with a particular dialed directory number, retrieving said alternate special access directory number associated with the role and dialing the outgoing call

with said alternate special access directory number in place of said particular dialed directory number.

5

10. A method as defined in claim 8 in which said feature is directory retrieval, in which the database includes a list of directory members of a group filling a particular role, and further including the steps of
10 processing an outgoing call by looking up said role in the database, and retrieving each of the directory numbers in said list, and forwarding an electronic mail message to each member of the group using the retrieved directory numbers in said list.

15

11. A method as defined in claim 3, in which the feature is call forwarding, and including the steps of storing in the database a number associated with a particular role, receiving an incoming call, looking up
20 said number associated with said particular role and forwarding said incoming call to said number associated with said particular role.

12. A method as defined in claim 11 including
25 modifying the number associated with said particular role and forwarding said incoming call to the modified number.

13. A method as defined in claim 1 including
30 processing the call by means of software agents receiving a request to complete the call, looking up said directory number and completing the call.

14. A method as defined in claim 1 including
35 associating the database with a switching system and completing the call to a line connected to the switching system.

15. A method of routing calls as claimed in claim 1 including an arrangement substantially described herein with reference to any one of Figs. 2 to 8 of the accompanying drawings.



Application No: GB 9703556.2
Claims searched: All

Examiner: Al Strayton
Date of search: 1 May 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4K: KF42; KF54

Int Cl (Ed.6): H04M

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2 301 983 A (MITEL) Entire document	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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